



FEASIBILITY ANALYSIS OF CHILD-FRIENDLY DISASTER RESPONSE EDUCATIONAL COMICS AS A SOCIAL STUDY LEARNING MEDIUM IN ELEMENTARY SCHOOLS

Ika Ari Pratiwi¹, Eko Handoyo^{2*}, Ani Rusilowati³, Trimurtini⁴

¹Universitas Negeri Semarang, Semarang, Indonesia; Universitas Muria Kudus, Kudus, Indonesia

^{2,3,4}Universitas Negeri Semarang, Semarang, Indonesia

*Corresponding Author: eko.handoyo@mail.unnes.ac.id

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Abstract. Flood disasters remain a major challenge in elementary schools in the Kudus area, while disaster mitigation learning in social studies has not been optimally implemented. This condition leads to limited student understanding of risks and disaster response measures. This study aims to analyze the feasibility of the child-friendly educational comic "*Sahabat Alam Tanggap Banjir di Kampung Kesambi*" as a social studies learning medium for fourth-grade elementary school students. This research method uses a research and development (R&D) approach, with the ADDIE model applied through the development stage. The comic was validated by material, media, and language experts using a Likert-scale instrument and then analyzed using a feasibility percentage conversion. The results showed a very high level of feasibility, with material validity of 94.4%, media validity of 95.8%, and language validity of 95.1%. This comic presents the flood phenomenon, its causes, and mitigation measures in a coherent, contextually relevant manner, tailored to students' characteristics. In addition, the comic also integrates social studies concepts such as human relationships with the environment, mutual cooperation, and environmental awareness. These findings indicate that child-friendly disaster response educational comics are highly suitable for use as social studies learning media in elementary schools. Comics not only support disaster literacy but also have the potential to enhance critical thinking skills and foster environmentally conscious character in students. The implications of this research suggest that child-friendly educational comics can strengthen contextual social studies learning and potentially enhance students' critical thinking skills and environmental character.

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Correspondence address:

Jl. Lamongan Tengah No.2, Bendan Ngisor, Kota Semarang.

eko.handoyo@mail.unnes.ac.id

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Program Studi PGSD Universitas Flores. Jln. Samratulangi,
Kelurahan Paupire, Ende, Flores.

primagistrauniflor@gmail.com

INTRODUCTION

Indonesia is highly susceptible to disasters. The geographic location at the intersection of three major tectonic plates and the intricate terrain result in the annual occurrence of various calamities, including earthquakes, volcanic eruptions, landslides, and floods. Kudus Regency, in Central Java, Indonesia, is frequently hit by flooding during the rainy season. The Kudus Regional Disaster Management Agency (BPBD) report (2024) indicates that in February 2024, flooding impacted 40 primary schools in the districts of Mejobo, Jati, Kaliwungu, and Undaan, with water levels ranging from 20 cm to 1 meter within classrooms. This disaster not only caused economic losses but also affected the education sector, especially for elementary school-aged children who are still in a very sensitive phase of cognitive and socio-emotional development. The flood disaster in Kudus serves as initial data on the urgency of disaster education in elementary schools that has not been optimally implemented. Disaster education should not only introduce the concept of mitigation, but also foster higher-order thinking skills such as problem-solving. Disaster education is carried out through the creation of disaster-safe educational units to protect students, teachers, staff, and the school community from the risks and impacts of disasters (Rasidi, 2024).

A literature review by Desilia et al. (2023) indicates that disaster education in Indonesia needs to be integrated into the broader curriculum for disaster preparedness and risk reduction. According to Rachmadtullah et al. (2025), early disaster mitigation education is an urgent need in elementary schools. Their research shows an increase in students' understanding of mitigation concepts, learning motivation, disaster response skills, and empathy and cooperation.

Understanding mitigation concepts and critical thinking skills is necessary when students face real-life situations such as flooding in their school environment. Disaster learning is important so that students do not just know what to do when a flood occurs, in line with Piaget & Vygotsky's constructivist theory, as [Nurlaeliyah \(2023\)](#) states that children learn more effectively when they experience and construct their own knowledge. Elementary school Social Studies classes are crucial for cultivating students' understanding of the interplay among humans, geography, and the environment, as well as communities' responses to natural events, especially disasters. Social Studies is a subject that discusses human interactions with the environment, particularly in geography, which is closely related to natural conditions ([Setyaningsih, 2024](#)). In this regard, humans must understand environmental risks to manage their living space safely and sustainably ([MacIntyre et al., 2020](#)). Research by [Oda & Ichinose \(2025\)](#) emphasized that schools are the most effective place for disaster mitigation education because they are integrated into the curriculum, and children must understand disaster risks as part of socio-environmental literacy for safe behavior.

Interviews conducted with multiple elementary school teachers in Kudus Regency in early September 2025 revealed that disaster education has not been comprehensively addressed. This topic constitutes merely a minor segment within the chapter on weather, seasons, and climate change in the fourth-grade social studies curriculum, which is constrained by time and divided among other subjects. To prevent pupils from delving too deeply into catastrophe material, learning is restricted to teacher explanations and reading activities focused on flood disasters within the school and home environments. Consequently, pupils' understanding of catastrophes is limited to mere facts and rote repetition. Students have not been invited to conduct flood-disaster mitigation scenarios to protect belongings as water begins to inundate various residential properties and the school. Students have not been encouraged to critically consider the implications of apathy towards the environment. Schools have not consistently organized collaborative cleaning activities involving instructors and pupils, since this responsibility has been managed by the school guard. Educators have failed to supply creative instructional media for teaching disaster-related content.

In light of the aforementioned issues, there is a need for contextual, engaging, and developmentally appropriate learning media, particularly narrative visual media such as comics, which can enhance understanding of flood events. Effective learning media can deliver contextual educational experiences by integrating images, narratives, and dialogues, facilitating students' organic comprehension of cause-and-effect linkages and promoting critical thinking about events in their surroundings. Comics are an effective social representation medium for conveying environmental phenomena and social issues through easy-to-understand illustrations and dialogue ([Destania & Efendi, 2024](#)). In line with [Yunsi & Ramadhan \(2022\)](#), comics can increase interest in learning, understanding of socio-environmental concepts, and long-term information retention. Furthermore, educational comics have been shown to improve understanding of social studies and foster social attitudes such as mutual cooperation and solidarity ([Sari et al., 2019](#)).

This research produced an instructive comic that uses child-friendly elements. The comic's child-friendly characteristics are apparent in its appealing, non-threatening graphics, which are easily comprehensible and readable. Research by [Mutia et al. \(2026\)](#) indicates that interactive comics focused on natural disaster mitigation can activate experiential reasoning, particularly when students learn by observing the experiences of characters in the story. Research by [Aswan \(2025\)](#) asserts that educational materials on disasters for children should avoid harsh imagery, menacing language, and anxiety-inducing storylines. Media need to convey knowledge using child-appropriate imagery, affirmative personalities, and soothing language. Educational comics serve as an ideal medium for conveying child-friendly ideas, as they feature visuals, vibrant colors, character representations, and simple stories that align with the developmental traits of primary school pupils. Strengthened by research [Ilhan et al. \(2026\)](#), digital comics are an effective pedagogical tool to make abstract environmental issues more concrete, increase student engagement, and support inquiry-based learning, as well as foster student responsibility ([Ramadhani & Safutri, 2025](#)).



This comic is utilized in social studies classes focusing on weather, seasons, and climate change for fourth-grade primary students throughout the first semester. Disaster education is critically important for promoting disaster literacy, environmental consciousness, and proactive preparedness. Social studies teach social ideas, the interaction between people and their environment, the responsibilities of citizenship, and the importance of collaboration in addressing social issues, such as floods in densely populated areas (Mujib et al., 2025). This cartoon illustrates the connections between humans and the environment, the responsibilities of citizens in preserving habitats, and the importance of responsible social conduct in IPS learning. This cartoon also corresponds with the principles of Disaster Risk Reduction (DRR). Disaster reduction underscores the need for early comprehension of hazards, causes, and mitigation strategies to diminish the effects of disasters. Research by Aronsson (2021) asserts that disaster risk reduction education at the basic level should be implemented progressively using visual narratives, tangible examples, and straightforward simulations. Comics are strongly advocated in DRR as they facilitate students' comprehension of cause-and-effect links in disasters, aid retention of emergency response procedures, and promote proactive environmental behavior. The study conducted by Amin & Bahri (2024) on the evolution of digital comics as a medium for disaster mitigation education demonstrates that mitigation comics effectively enhance students' awareness of disasters and their understanding of risks through clear, approachable visual representations.

Prior research by Hasanah et al. (2021) indicates that the AnyFlip digital comic medium enhances social studies learning outcomes in primary education, and Supryanto et al. (2025) studied interactive instructional comics. Utilizing local culture enhances primary school children's critical thinking abilities. Consistent with the findings of İlhan et al. (2026), environmental comics enhance motivation for social studies learning, conceptual comprehension, and environmental consciousness. Additionally, Mutia et al. (2026) revealed that comics depicting local social settings might enhance environmental awareness, while Septikasari et al. (2024) illustrated the efficacy of comics in disaster preparedness. This aligns with the research findings of Sujinah et al. (2023), which indicated that comics derived from photographs and local culture might enhance students' knowledge and resilience in the face of catastrophes. This contrasts with the findings of Rachmadtullah et al. (2025), which highlighted the significance of school-based disaster education that engages students as active participants. Nonetheless, there is a divergence in methodology: DRR often employs textual modules or simulations, whereas this study uses child-friendly comics, which are better suited to the emotional and cognitive growth phases of primary school children.

This research introduces an innovative learning medium in the form of comics that incorporate three primary elements: 1) instructional comics focused on flood disaster response, 2) a child-friendly methodology, and 3) application within elementary school social studies teaching. The instructional components of this comic feature child-appropriate imagery and speech, commendable characters, and emotionally secure pictures. This research produced an instructive cartoon titled "*Sahabat Alam Tanggap Banjir di Kampung Kesambi*," focusing on disaster response. The child-centric methodology is depicted through visually appealing comic illustrations that are engaging and non-threatening for youngsters. The vocabulary utilized in the comic aligns with the developmental features of fourth-grade primary school pupils. The instructional comic's content on catastrophe aligns with the primary school social studies curriculum on weather, seasons, and climate change. Consequently, this research offers a more contextually grounded approach to social studies issues.

Prior to its use in social studies instruction for fourth-grade elementary children, educational comic media products underwent validation to confirm content appropriateness, conceptual correctness, readability, and alignment with the characteristics of elementary school learners. Media validity is essential in development research (R&D), as articulated by Jamal & Dwidarti (2025), indicating that expert validity assessment is necessary to confirm that the product adheres to educational norms, academic rigor, and linguistic appropriateness. Validation was conducted by specialists in materials, media, and linguistics. The comics created in this study



employ a child-friendly methodology, featuring imagery and language conducive to children's cognitive development. This comic features materials on disaster response, specifically DDR.

This paper evaluates the viability of child-friendly disaster-response instructional comics as a pedagogical tool for fourth-grade social studies in elementary schools. The feasibility investigation was conducted by validators, specialists in learning media, experts in primary school social studies instructional materials, and linguistic authorities relevant to the educational comics under development. This instructional comic was created using the Research and Development (R&D) approach within the ADDIE paradigm (Analysis, Design, Development, Implementation, Evaluation), reaching the development phase. This research has theoretical implications for the development of DDR social studies learning media for children, particularly at the elementary school level, and offers educational comics that facilitate children's comprehension of flood risks. This research evaluates the efficacy of instructional comics in enhancing critical thinking and fostering environmental awareness among fourth-grade primary pupils.

RESEARCH METHODS

This Research and Development (R&D) initiative used the ADDIE approach (Analysis, Design, Development, Implementation, and Evaluation). The creation of this comic progressed to the development stage, since this research primarily concentrated on the feasibility analysis or validity assessment of child-friendly disaster response instructional comics as a pedagogical tool for elementary school social studies. The evaluation of the comic feasibility test process was conducted by specialists, comprising 1) material expert validators to assess the viability of disaster materials and flood mitigation strategies in elementary school social studies education, 2) media expert validators to evaluate the feasibility of comic media concerning imagery, illustration presentation, and coloring, and 3) language validators to gauge readability, linguistic clarity, and appropriateness for child development.

This study was carried out at primary schools in Kudus that were susceptible to flooding. Kudus Regency comprises four sub-districts susceptible to flooding: Mejobo, Undaan, Jati, and Kaliwungu. This study was conducted in many flood-prone educational institutions in the Mejobo region. The development research phase began with the analysis stage, which identified the social studies learning requirements concerning flooding concerns and environmental awareness among primary school children. The investigation involved an evaluation of the Independent Curriculum primary school social studies curriculum, disaster literacy requirements, and students' cognitive development at the concrete operational level. A study of geographical circumstances was conducted based on the prevalence of environmental flooding in school or home areas, enabling the development of learning media tailored to kids' social experiences.

The design phase encompassed the compilation of the comic design, the creation of a synopsis, and the development of the tale, dialogue, principal characters (*Chabib, Guru, and "Si Air"*), images of the flood environment, and messages for disaster mitigation. The comic design adhered to the concepts of the Cognitive Theory of multimedia learning, namely coherence, signaling, contiguity, and modality, ensuring comprehensibility for youngsters. Furthermore, the child-friendly disaster education principles established by UNICEF were employed to ensure that the illustrations did not induce worry and to use kind, courteous, and developmentally appropriate discourse. At this point, the storyline, panel arrangement, coloring, text size, and incorporation of social studies themes such as mutual cooperation and environmental responsibility were also developed.

The third step was development, encompassing the comic creation process, education, catastrophe response, and the feasibility testing of comic media. Validation tools were administered by specialists in materials, media, and language to evaluate their viability (Suwarti et al., 2020). The validation questionnaire was constructed using indicators tailored to the requirements of the comic under development. The questionnaire sheet had 12 items for each material, medium, and language validation instrument, with each instrument evaluated by three validators. The validation subjects included material experts (elementary school teachers and social studies lecturers), media experts (lecturers specializing in learning media innovation and



award-winning teachers), and language experts (lecturers proficient in Indonesian).

The validation instrument for evaluating comics encompasses: 1) material aspects, which include the appropriateness of disaster content, comprehensiveness of information, and precision of mitigation strategies; 2) media aspects, comprising visual aesthetics, appropriateness of illustrations, and design appeal; and 3) language aspects, involving clarity of language, alignment with student developmental stages, and efficacy of dialogue. This procedure was conducted to assess the appropriateness of social studies and catastrophe materials, the quality of visual media, and the linguistic suitability, utilizing a Likert scale. The Likert scale was employed to transform the proportion of findings into a feasibility evaluation (Mandaresta et al., 2023). The validation tool, a Likert scale ranging from 1 to 4, was derived from the mitigation media validation instrument developed by Amin & Bahri (2024) and Noviana et al. (2020). This phase also encompasses comedic changes informed by expert feedback.

The researchers measured the results of the expert's feasibility test using the average percentage of validation results of Sugiyono's formula (Sugiyono, 2019):

$$\text{Total score} = \frac{\sum s}{s_{\max}} \times 100\%$$

X= The results that were obtained, $\sum s$ =Total Scores Obtained, $s_{\max}$ =Maximum Score

Table 1. Conversion of Feasibility Test Scores

Eligibility Score	Eligibility Classification	Mark
86%-100%	Very Worthy	A
76%-85%	Worthy	B
60%-75%	Quite Decent	C
55%-59%	Less than worthy	D
≤54%	Not feasible	E

As shown in Table 1, the researchers obtained feasibility test scores for material, media, and language by applying the feasibility test formula. The researchers then classified the table according to Sugiyono's (2019) sources. In this study, the scores for each feasibility test result were presented during the educational comic development process to determine the expert feasibility assessment results, which indicated that comic media were very feasible, feasible, quite feasible, less feasible, and even not feasible for use in this study.

RESULTS AND DISCUSSION

The research completed by the investigator culminated in a learning media product, namely an instructional disaster response comic titled "*Sahabat Alam Tanggap Banjir di Kampung Kesambi*." This instructional comic serves as a supplementary resource in the Social Studies (IPAS) curriculum to instruct fourth-grade primary pupils on weather, seasons, and climate change. This cartoon educates children about responding to flood catastrophes and fosters an attitude of environmental awareness. Educational media must facilitate students' comprehension of the information; hence, the media presentation should be appealing and engaging (Fitriana et al., 2024). The instructional comic "*Sahabat Alam Tanggap Banjir di Kampung Kesambi*" was developed using the ADDIE model, comprising five stages: analysis, design, development, implementation, and assessment. The findings of this study are delineated at the analytical and development stages, specifically to evaluate the viability of the disaster response educational comic.

Expert validation was performed to evaluate the appropriateness of the comic content, the precision of disaster and social studies information, graphic quality, layout, and the acceptability of language and conversation. This research presents the outcomes of the feasibility assessment or validation of educational comics, undertaken by material, media, and language specialists, which yielded a high percentage, indicating their suitability as a social studies learning medium for fourth-grade primary school children. Each validator rated the comic on a Likert scale from 1 to 4, and the scores were converted to feasibility percentages. The medium is considered practical if it achieves $\geq 67\%$ and highly feasible if it achieves $\geq 86\%$. This document outlines the findings from the developmental research phases of the instructional comic "*Sahabat Alam Tanggap*



Banjir di Kampung Kesambi."

A. Analyze

A requirements analysis was conducted to identify the disparity between optimal and actual conditions for disaster management education in elementary schools within Kudus Regency. Research by [Mandaresta et al. \(2023\)](#) elucidated that the analysis phase constitutes the preliminary stage in developmental research, intended to discern problems and disparities within a research subject, thereby facilitating the identification of suitable interventions to resolve these issues. This cartoon requires investigation concerning the catastrophic situation in Kudus. Kudus is situated in a region of Central Java that is susceptible to seasonal flooding, particularly in Mejobo, Kaliwungu, Jati, and Undaan. Flooding directly affects educational activities by disturbing learning, compromising student safety, and undermining children's psychological well-being.

Interviews with many school administrators reveal that they have not fully instructed students on fundamental mitigation measures, such as relocating to a safe area, protecting valuables, or avoiding play in aquatic zones. This underscores the need for disaster education media that is straightforward, secure, and comprehensible to kids. Comic media is essential for students to comprehend the flood-prone environmental conditions in Kudus, corroborating [Ramdhani's \(2020\)](#) research, which found that digital comics effectively enhance comprehension of Indonesia's geographical characteristics through imagery. Underscore the need for instructional comics on disaster response for kids in Kudus, demonstrating that digital comics enhance children's resilience and understanding of catastrophe risks through visual narrative ([Amin & Bahri, 2024](#)).

This cartoon was created to address the scarcity of child-friendly disaster mitigation resources in elementary schools in Kudus. Educators continue to emphasize the hazards of historical floods, provide photos of inundation occurrences in Kudus, and use terminology that occasionally induces anxiety among students. The findings of [Noviana et al. \(2020\)](#) indicate that using comics for disaster education is the most effective alternative for elementary school students, owing to their straightforward illustrations, authentic dialogue, and narratives that foster a sense of security and facilitate comprehension of disaster risks.

The need for instructional comics on disaster response is relevant to primary school social studies curricula. The Merdeka Curriculum mandates that social studies education cultivate students' abilities to comprehend human-environment connections, encompassing social conduct and environmental consciousness in the context of catastrophes. Educational institutions ought to impart environmental knowledge about floods; yet there is a lack of specialized instructional resources that integrate flood mitigation with education. This underscores the need to teach comics illustrating disaster-prone scenarios in Kudus. This aligns with the research findings of [Wahyudi & Hidayatullah \(2022\)](#), who found that visual and narrative comics effectively enhance mitigation literacy among primary school pupils by simplifying safety protocols. Consequently, several educators articulated the necessity for interactive learning media that align with children's experiences and are narrative-driven to enhance students' comprehension of disaster-related content.

B. Design

Design was the second stage of the ADDIE model in the process of developing educational comics for disaster response. At this stage, researchers designed the comic structure, storyline and storyboard, visuals, dialogue, and educational messages developed in the comic. This comic was created in Canva. The educational comic for disaster response, "*Sahabat Alam Tanggap Bencana Banjir di Kampung Kesambi*," was named after Kesambi Village in Mejobo District, Kudus Regency, which is one of the areas prone to flooding. The design process for disaster response educational comics included the following: 1) setting learning objectives, 2) creating a storyline that matches events, 3) creating a visual design (storyboard) with panel numbers, 4) designing characters and environments, 5) writing child-friendly dialogue, 6) adding educational panels, and 7) expert validation.

The design process for the disaster response educational comic, "*Sahabat Alam Tanggap*



Bencana Banjir di Kampung Kesambi," is shown in Figure 1.

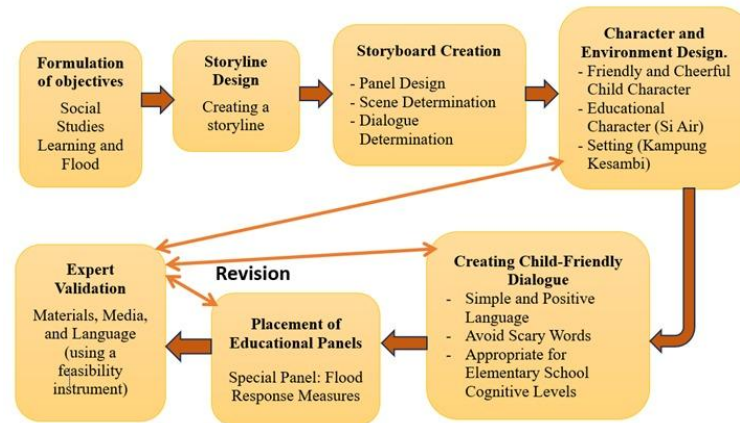


Figure 1. Flowchart of Design for Developing Educational Comics for Disaster Response

Based on Figure 1, the process of developing educational comics for disaster response begins with the first stage of formulating learning objectives. By establishing the learning objectives of the Elementary School Social Studies Merdeka Curriculum, the comics focus on the relationship between humans and the environment and on social actions in disaster mitigation. Includes disaster preparedness competencies by recognizing flood signs, recognizing disaster responses and steps, and having an environmentally conscious attitude. The preparation of media design must be oriented towards learning objectives (Supryanto et al., 2025).

The second stage is compiling a story. The storyline is simple, plain, and logical, and follows the chronology of events so that students can easily understand the cause-and-effect relationship. According to Amin & Bahri (2024), sequential stories help students explain the causes and effects of disasters and understand the concept of disaster risk more effectively. In this comic, the storyline includes the introduction of characters (students, teachers, residents, and the personification character *Air*), the emergence of problems (heavy rain, clogged drains, and flooding), the peak of the problem (water entering the schoolyard), the character's response (the teacher calms down, and the students look for a place), education by the character who helps (*Si Air* explains the cause of the flood), solutions and mitigation (community work cleaning drains), and moral messages (care for the environment and cleanliness). Mitigation comics must present disasters in a safe, non-scary manner and focus on solution-based actions, in accordance with child-friendly disaster communication guidelines (Aswan, 2025).

The third stage is the preparation of the visual design (storyboarding, namely, the initial visual design of the comic that describes the number of panels, character layout, initial dialogue and narration, visual warning signs, text or dialog, and mitigation scenes. Each panel is designed according to the principles of coherent sequencing and signaling in multimedia learning theory, including visual emphasis, the placement of text and images together, and the avoidance of overcrowding. In addition, explains that the sequential panel structure facilitates cognitive processing and focuses students on reading visual symbols. Storyboards help ensure that comics do not contain visuals that could harm children, demonstrating that comics are developed with child-friendly principles.

The fourth stage is designing the characters and environment; the characters in the comic must represent the world of children and the local context. In the disaster response educational comic, the main characters are elementary school students (*Chabib* and his friends). The teacher character provides calming instructions, the character "*Si Air*" provides scientific explanations in a gentle, child-friendly manner, and facial expressions are adjusted to convey empathy rather than fear. Research by Noviana et al. (2020) shows that child-friendly characters increase students' self-efficacy in understanding disasters. Therefore, the characters in this comic have a child-friendly appearance, use expressions, and represent the local culture of Kudus. This comic character aligns with Sujinah et al. (2023) in that narrative or personified characters can help children understand the concept of disaster without fear.

The fifth stage is preparing a child-friendly dialogue. In this comic, the language is designed to suit the literacy level of fourth-grade elementary school students, to follow the principles of child-friendly language, and to be suitable for social studies learning. According to Wahyudi & Hidayatullah (2022), the language used in disaster education must be safe, informative, and non-fearful. This aligns with Destania & Efendi (2024), who state that language must be appropriate for students' concrete cognitive development. The characteristics of the language used in this comic include short sentences, simple, non-technical diction, and the absence of words that could cause trauma for children.

The sixth stage of educational placement is a fort for the mitigation material; this comic includes a special panel listing flood response steps. This educational panel is designed to increase knowledge of disaster risk (Amin & Bahri, 2024). The special panel for flood response includes the following: don't panic, secure your belongings, stay away from water, report to an adult, and keep the environment clean. The final stage is expert validation. Before the final production of the comic design, experts were consulted to ensure the accuracy of the flood material, the visual safety for children, the storyline's appropriateness to the students' thinking stage, and the language's appropriateness for children's literacy. This is done with material validation experts, media experts, and language experts to ensure that the lightweight visual media design increases reading comfort and student accessibility (Jamal & Dwidarti, 2025).

C. Development

The next stage was the development of an educational disaster response comic titled "*Sahabat Alam Tanggap Bencana Banjir Kesambi*." The study's results indicate that this educational comic has high validity and feasibility. Therefore, it can be considered a suitable learning medium for social studies instruction in elementary schools. Analytically, these findings confirm that comics, as a learning medium, can meet the needs of students at the concrete operational stage of cognitive development because visuals help them understand social and environmental events more easily and meaningfully (Desilia et al., 2023). The validity instruments for material, media, and language each consist of 12 items on a Likert scale of 1 to 4, yielding a minimum score of 12 and a maximum score of 48 for each instrument. The validation or feasibility test for disaster response educational comics, conducted by validator experts on the feasibility aspects of material, media, and language, produced the following data.

Analysis of Material Feasibility in Comics

The material feasibility analysis was conducted to ensure that the content presented in the comic aligned with the objectives of social studies learning and disaster concepts. The parts assessed in the material were: a) the suitability of the content in the comic with the material; b) the completeness of the comic material content, including all important components in disaster learning; and c) the accuracy of the mitigation steps to assess whether the actions shown in the comic are in accordance with the principles of disaster risk reduction. Based on validation measurements using Sugiyono's (2019) formula, the results of the material feasibility test conducted by 3 experts yielded an average percentage score of 94.4%, indicating that the comic clearly, logically, and contextually presented the flood phenomenon. Table 2 recapitulates the results of the material feasibility test in the comic.

Table 2. Material Validation Results

Aspect	Expert Score 1	Expert Score 2	Expert Score 3	Average Percentage	Criteria
Suitability of disaster materials	15	16	15	95.8%	Very worthy
Completeness of material content	15	15	16	95.8%	Very worthy
Accuracy of mitigation steps	14	15	15	91.6%	Very worthy
Total Score	44	46	46	94.4%	Very worthy

Based on the data in Table 2, the results of the feasibility test by three subject matter experts (two subject matter expert teachers and one social studies lecturer), namely: a) the suitability of disaster material obtained an average of 95.8% with feasible criteria; b)



completeness of material content with an average of 95.8% and very feasible criteria; and c) the accuracy of mitigation steps with an average of 91.6% and very feasible criteria. The average total is 94.4%, indicating excellent suitability of the comic for social studies learning. The flood material in this comic aligns with social studies learning to develop the competency of "human relations with the environment," as expected in the independent curriculum. This comic visualizes the causes of flooding, such as garbage in gutters and a lack of environmental care, and shows mitigation steps according to BNPB. The material presented in this comic is in accordance with disaster standards, so DRR provides a clear understanding of risk mitigation, risk assessment, and initial response.

The results of this study align with international disaster education standards, which state that DRR content must include elements of understanding risk, preventive measures, and safety measures (Septikasari et al., 2024). This aligns with recent global studies that emphasize the need for disaster comics to be developed through media that explain the causes and effects of risks in a narrative-visual manner. In addition, research by Ramdan et al. (2024) found that children's disaster education requires simple, concrete representations so they can understand flood risks and make safe decisions appropriate to their cognitive development stage. This coherent cause-and-effect flow aligns with the standard disaster-narrative structure used in international disaster-mitigation comics (Amin & Bahri, 2024). The revised validator input included adding a narrative at the beginning as an introduction and displaying mitigation steps in a dedicated panel.

Analysis of Media Feasibility in Comics

Analysis of comic media feasibility by 3 experts to assess the quality of the visual appearance and design of comics as a learning tool. Aspects of media feasibility included: a) visual appearance to assess the design's attractiveness, display comfort, and story readability; b) suitability of illustrations to assess the comic's display images according to the material and storyline; and c) design attractiveness to assess the overall appeal of comics as a learning medium. The media validation results obtained a value of 95.8%, indicating that the disaster response educational media is effective for children. The neat panel design, bright colors, simple illustrations, and easy-to-read character expressions support visual-based learning. The panels have been arranged more coherently and consistently, making it easier for readers to understand the flow from problems to solutions. This is supported by research by Amin & Bahri (2024), which shows that these visual improvements create a stronger story structure and that children understand disaster mitigation better through systematic image sequences than through plain text. The results of the media feasibility test on comics are presented in Table 3.

Table 3. Media Validation Results

Aspect	Expert Score 1	Expert Score 2	Expert Score 3	Average Percentage	Criteria
Visual display	16	16	15	97.9%	Very worthy
Suitability of illustrations	14	15	15	91.6%	Very worthy
The attractiveness of the design	16	16	15	97.9%	Very worthy
Total Score	46	47	45	95.8%	Very worthy

As shown in Table 3, the results of the feasibility test include three aspects, namely, a) the visual appearance aspect with an average of 97.9% and very feasible criteria, b) the illustration suitability aspect with a result of 91.6% and very feasible criteria, and c) the design attractiveness aspect with a result of 97.9% and very feasible criteria. In the disaster response educational comic, images of clogged drains and rapidly overflowing water facilitated students describing flood risks concretely. Children learn better when text and images clarify each other. Research by Sari et al. (2020) shows that learning through simulation methods and picture books increases students' knowledge of disaster preparedness. Recent research by Rofifah et al. (2026) proves that environmental comics can improve ecological literacy because visual narratives make it easier for students to understand cause-and-effect relationships.

The comic's bright color palette and illustrations embodied child-friendly values, supporting students' emotional comfort. Soft colors and child-friendly illustrations are crucial in



disaster education because they can reduce fear and increase children's courage to learn about environmental risks. Research [Aswan \(2025\)](#) demonstrated a strong preference for the Big Book format and bright, semi-realistic illustrations. This study concluded that educational comics based on local contexts have the potential to improve children's understanding, retention, and preparedness in disaster-prone areas. This comic depicts flooding caused by waste, the role of citizens, and social cooperation, which are core aspects of elementary school social studies. This comic provides sufficient visual stimulation without confusing students. The use of the character "*Si Air*" as a personification of a natural element also strengthens students' emotional engagement as readers. The aspect of media suitability also aligns with the theory of educational graphic design, as emphasized by [Jamal & Dwidarti \(2025\)](#), which emphasizes visual engagement, clarity, and cognitive speed. The use of bright colors, a coherent panel layout, and the ability to present information through text in this comic simultaneously support optimal learning for elementary school students.

Analysis of Language Feasibility in Comics

The language validity score was 95.1%, with a very good rating. This indicates that the comic uses simple, communicative, and child-friendly language. The language was easy to read; it used short sentences, simple dialogue, and avoided confusing technical terms. This aligns with UNICEF's child-friendly communication guidelines, which state that messages for children should be positive, simple, and non-anxiety-inducing. The language aspect measures clarity, readability, suitability to the child's cognitive development level, and the psychological safety of the dialogue. [Table 4](#) presents the results of the language suitability test for the comic.

Table 4. Language Validation Results

Aspect	Expert Score 1	Expert Score 2	Expert Score 3	Average Percentage	Criteria
Language clarity	14	16	15	93.75%	Very worthy
Appropriateness to student development	14	15	15	91.6%	Very worthy
Effectiveness of dialogue	16	16	16	100%	Very worthy
Total Score	44	47	46	95.1%	Very worthy

Based on the data in [Table 4](#), the result of the feasibility test by 3 language experts (3 lecturers in the field of Indonesian), there are three aspects assessed, namely: a) the aspect of language clarity with an average of 93.75% and very appropriate criteria, b) the aspect of suitability with student development with an average of 91.6% and very appropriate criteria, and c) the aspect of dialogue effectiveness with an average of 91.6% and very appropriate criteria. The delivery of language in the comic has conveyed safety messages through narrative and dialogue ([Sujinah et al., 2023](#)). The preparation of disaster media must consider the appropriateness of language and moral messages to students' cognitive development. The use of child-friendly language in this comic is demonstrated through the character "*Si Air*" who explains the causes of flooding without being intimidating. Disaster education for children should be non-traumatic and should adhere to child-friendly principles

Product Improvement Stage

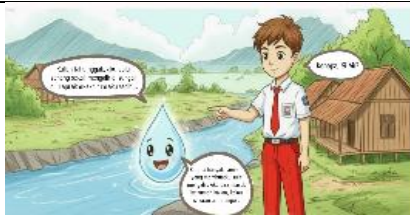
The validation was conducted to assess the appropriateness of the material, media, and language in the disaster response educational comic "*Sahabat Alam Tanggap Bencana Banjir di Kampung Kesambi*." The next stage involved improvements or revisions to the comic product based on expert input following the previous assessment ([Bulkani et al., 2022](#)). This stage aimed to refine the product to ensure usability in learning, effectiveness, safety, and appropriateness for elementary school students. [Table 5](#) presents the validator input and product revisions.

Based on the data in [Table 5](#), several inputs provided by the validator are presented, including: 1) Adding an opening narrative. The educational comic product in the initial design lacked an introduction that explained the story's context, so the plot was unclear at the outset. Therefore, an opening narrative was added to provide students with an initial overview of the situation to be described. 2) Adding a narrative about the cause of flooding. There was no explanation for the causes of flooding; then a narrative of those causes was added. This revision



was done to make the comic not only descriptive but also educational by showing the cause-and-effect relationship. Thus, students could understand that flooding did not happen suddenly but was influenced by human behavior and environmental conditions. 3) Adding disaster mitigation messages in a special panel on the whiteboard. In the initial design, the mitigation steps were not clearly structured; revisions added mitigation messages to the whiteboard to help students more easily remember the steps to take when a flood occurs. 4) Using child-friendly language in the dialogue. Some dialogues were considered too short or potentially triggering fear, such as the phrase "I was angry and went into your house." In the revised version, the phrase was replaced with a more emotionally safe one: "I can go into your house if the drain is clogged." Then, these changes were made according to the expert validator's instructions and in accordance with the child-centered communication guidelines in disaster education by [Wahyudi & Hidayatullah \(2022\)](#), ensuring that the language of disaster education for children is empathetic and helps children feel safe when learning about risks.

Table 5. Validator Suggestions and Product Revision Results

Validator Suggestion	Comic Product Before Revision	Comic Product After Revision
Added opening narration	 There is no opening narrative according to the topic yet	 Opening narration has been added
Add a narrative of the causes of the flood disaster	 There is no narrative yet about the cause of the flood	 There is already a narrative about the causes of the flood
The design does not yet contain a disaster mitigation message	 There are no disaster mitigation messages on the board yet	 There is already a flood disaster mitigation message on the blackboard
The dialogue is not child-friendly, because it still uses frightening terms.	 In the dialogue "The Water" there is still the term "water gets angry and becomes a flood", namely "I became dirty and angry, until it turned into a flood".	 He has used more polite language, namely "I can enter your house if the water pipe is blocked."

Based on expert validation, this comic not only provides disaster knowledge but also builds an environmentally conscious character through child-friendly media principles. Moral messages such as protecting rivers, not littering, and planting "Friendship Trees" align with the ecological character learning model (Kumar R et al., 2021). Research by Yang et al. (2022) shows that narrative media can increase ecological empathy and environmentally conscious behavior. This comic is set in Kesambi Village, in accordance with the principle of contextualized learning (Bulkani et al., 2022), which holds that using local context enhances the meaning of learning because students recognize situations similar to their own. Overall, the validity results indicate that this child-friendly disaster response educational comic is highly appropriate for the elementary school social studies curriculum, which emphasizes social relationships, the environment, and community action in addressing problems. Research by Fitriania et al. (2024) indicates that local narrative-based media can improve students' social and environmental literacy by connecting the material to everyday experiences. The educational comic "*Sahabat Alam Tanggap Bencana Banjir di Kampung Keuses*" uses the local context of Kesambi Village in Mejobo District, Kudus Regency, which is highly relevant to students and thus fulfills the principles of contextual learning. In line with Taqqiyah et al.'s (2021) research, developing educational comics as a learning medium is a key driver of increased students' knowledge of disaster mitigation in the area.

This comic supports social science learning outcomes, namely analyzing the relationship between humans and the environment; demonstrating the social role of citizens in protecting the environment; and identifying social problems and how to address them. This aligns with Oktaviani's (2025) research, which found that environmental-based learning can connect social science concepts with students' lived realities, thereby fostering social awareness, responsibility, and understanding of local social issues. Activities such as environmental observations, field studies, and community-based collaborative projects have proven effective in strengthening students' active engagement in learning. This comic shows the mitigation process, not just appeals, and provides concrete examples through images and dialogue about planting trees and doing community service. This helps students understand environmental risks in an area through stories. In addition, according to Pratiwi (2021) and Supryanto et al. (2025), comic media based on local wisdom is expected to arouse students' interest and develop critical thinking among elementary students.

CONCLUSIONS AND SUGGESTIONS

This study finds that the educational comic "*Sahabat Alam Tanggap Banjir di Kampung Kesambi*" is highly appropriate as a child-friendly medium for social studies instruction in primary schools. The comic attained exceptional validity regarding content (94.4%), media (95.8%), and language (95.1%), demonstrating that all elements conform to pedagogical standards, principles of child-friendly disaster education, and social studies learning objectives concerning the human-environment relationship. The comic effectively illustrates the origins, effects, and mitigation strategies aligned with DRR concepts, using a story and imagery that avoid inducing worry. Consequently, the comic fulfills the research aims outlined in the introduction: to deliver contextual learning material that is entertaining, safe for pupils (child-friendly), and capable of enhancing disaster literacy and environmental awareness.

Additional study is advised to evaluate the comic's efficacy in enhancing critical thinking abilities and environmental awareness via extensive classroom trials. Educators may utilize this cartoon as supplementary instructional material for social studies or theme projects about catastrophes. Furthermore, comics may be transformed into interactive digital forms or enhanced with reflective tasks, quizzes, and basic simulations to further captivate pupils. Additional study may facilitate the creation of disaster risk reduction comics, enhancing child-friendly educational materials in primary schools.

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